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NASA-15764 (December 2003)
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NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION

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SECTION 15764

FAN-COIL UNITS
12/03

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NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This section covers fan-coil units for temperature-control assemblies.

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.

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The publications listed below form a part of this section to the extent referenced:

AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI)

ARI 440	(1998) Standard for Room Fan-Coil Air-Conditioning

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI S12.23	(1989; Rev 1996) Method for the Designation of Sound Power Emitted by Machinery and Equipment

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 1940-1	(1986e) Mechanical Vibration - Balance Quality Requirements of Rigid Rotors - Part 1: Determination of Permissible

Residual Unbalance

NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA)

NEMA MG 1 (1998) Motors and Generators

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 90A (2002) Standard for the Installation of Air Conditioning and Ventilating Systems

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD 810 (Rev F; 2000) Department of Defense Test Method Standard for Environmental Engineering Considerations and Laboratory Tests

UNDERWRITERS LABORATORIES (UL)

UL Bld Mat Dir (1999) Building Materials Directory

UL 883 (1986; 6th Ed; Rev thru Feb 15, 1989; Errata Apr 24, 1989) UL Standard for Safety Fan-Coil Units and Room Fan-Heater Units

1.2 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.

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The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES in sufficient detail to show full compliance with the specification:

SD-01 Preconstruction Submittals

Material, Equipment, and Product Installation Lists shall be submitted in accordance with paragraph entitled, "General Requirements," of this section.

SD-02 Shop Drawings

Fabrication Drawings shall be submitted for fan coil units in accordance with paragraph entitled, "General Requirements," of

this section.

Installation Drawings shall be submitted for fan coil systems in accordance with the paragraph entitled, "Installation," of this section.

SD-03 Product Data

Equipment and Performance Data shall be submitted for fan coil units in accordance with paragraph entitled, "General Requirements," of this section.

Manufacturer's catalog data shall be submitted for the following items:

Coils
Casing
Enclosure
Motors
Fan
Drain Pans
Filters
Controls
Vibration Isolation

SD-04 Samples

Manufacturer's Standard Color Chart shall be submitted for fan coil units in accordance with paragraph entitled, "General Requirements," of this section.

SD-07 Certificates

Listing of Product Installations shall be submitted for fan coil units in accordance with paragraph entitled, "Installation," of this section.

Certificates shall be submitted for following items showing conformance with the referenced standards contained in this section.

Coils
Casing
Enclosure
Motors
Fan
Drain Pans
Filters
Controls

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals shall be submitted in accordance with paragraph entitled, "Operation and Maintenance," of this

section.

1.3 GENERAL REQUIREMENTS

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NOTE: If Section 15003 GENERAL MECHANICAL PROVISIONS is not included in the project specification, applicable requirements therefrom should be inserted and the following paragraph deleted. If Section 15072 VIBRATION ISOLATION FOR AIR CONDITIONING EQUIPMENT is not included in the project specification, applicable requirements therefrom should be inserted and the second paragraph deleted. If Section 16225 MOTORS is not included in the project specification, applicable requirements therefrom should be inserted and the third paragraph deleted.

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[Section 15003 GENERAL MECHANICAL PROVISIONS applies to work specified in this section.]

[Section 15072 VIBRATION ISOLATION FOR AIR CONDITIONING EQUIPMENT applies to work specified in this section.]

[Section 16225 MOTORS applies to this section.]

Listing of Product Installations shall be submitted for fan coil units showing a minimum of 5 installed units, similar to those proposed for use, that have been in successful service for a minimum period of 5 years. List shall include purchaser, address of installation, service organization, and date of installation.

Fabrication Drawings shall be submitted for fan coil units consisting of fabrication and assembly details to be performed in the factory.

Material, Equipment, and Product Installation Lists shall include the manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site information.

Equipment and Performance Data shall be submitted for fan coil units consisting of use life, system functional flows, safety features, and mechanical automated details. Curves indicating tested and certified equipment response and performance characteristics shall also be submitted, including vibration isolation.

Manufacturer's Standard Color Chart shall indicate the manufacturer's standard color selections and finishes for fan coil units.

PART 2 PRODUCTS

2.1 GENERAL

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NOTE: Fan and motor balance shall conform to ISO Std. 1940/1 - (1986) Balance Quality Requirements of Rigid Rotors - Determination of Permissible Residual Unbalance unless otherwise noted. Motor vibration levels shall conform to NEMA Specification MG-1, Motors and Generators, Part 7 unless otherwise noted.

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NOTE: When possible the use of sealed bearings is encouraged. One of the major causes of bearing failures is overlubrication and lubrication contamination. Using sealed bearings helps to eliminate this failure mode.

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[Units shall include an enclosure for cabinet models and casing for concealed models.]

Base unit shall be complete with galvanized casing, water-coil assembly with auxiliary water or steam heating-coil, valve and piping package, drain pans, air filter, fan motor, and motor control. Sound-power-level, decibels reference, 10 to the minus 12 power watt, at the fan operating speed selected to meet the specified capacity, shall not exceed the following values at the midfrequency of each octave band:

	OCTAVE BANDS				
	3RD	4TH	5TH	6TH	7TH
Frequency (hertz)	250	500	1,000	2,000	4,000
Power Level (decibels)	60	55	53	50	48

Sound-power-level data or values for these units shall be obtained in accordance with the test procedures specified in ANSI S12.23. Sound-power values apply to units provided with factory-fabricated cabinet enclosures and standard grilles. Values obtained for the standard cabinet models will be acceptable for concealed models without separate tests provided there is no variation between models as to the coil configuration, blowers, motor speeds, or relative arrangement of parts. Each unit shall be fastened securely to the building structure. Capacity of the units shall be as indicated. Room fan-coil units shall be certified as complying with ARI 440 and shall meet the requirements of UL 883.

2.2 ENCLOSURE

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NOTE: Supplement the following when exposed-to-view surfaces are an architectural feature.

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Enclosure shall be constructed of not lighter than 18-gage 1.3 millimeter steel, properly reinforced and braced. Front panel of enclosure shall be removable and provided with 1/2-inch 13 millimeter thick insulation conforming to NFPA 90A, to prevent condensation. Discharge louvers shall be four-way adjustable and shall be designed to properly distribute air throughout the conditioned space. All ferrous-metal surfaces shall be galvanized or treated with a rust-inhibiting finish. All exposed-to-view enclosure corners and edges shall be rounded. Discharge louvers shall be mounted in a top panel that is removable for coil cleaning. Access doors shall be hinged and shall be provided for all piping and control compartments. Enclosure finish shall be manufacturer's standard in color selected by the Contracting Officer.

2.3 CASING

Casing shall be acoustically and thermally insulated internally with not less than 1/2-inch 13 millimeter thick insulation conforming to NFPA 90A, fastened with waterproof and fire-resistant adhesive.

2.4 FAN

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NOTE: Evaluate necessity for reference to MIL-STD 810.
****

Fan shall be galvanized steel or aluminum, centrifugal type with [_____] blades. In lieu of metal, wheels and scrolls shall be fabricated or molded from suitably reinforced nonmetallic compounds certified to have satisfactorily passed the low temperature, high temperature, temperature shock, and sand and dust tests for ground equipment, outlined in MIL-STD 810, without deformation, cracking, corrosion, or loss of balance characteristics. All surfaces shall be smooth. Assemblies shall be accessible for maintenance. Disassembly and reassembly shall be by mechanical fastening devices, not adhesives. Fan shall be balanced dynamically and statically to ISO 1940-1 at the factory, after assembly in unit.

2.5 COILS

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NOTE: Two-way, three-way, or four-way control valves shall be indicated and shall be provided under Section 15902 CONTROL SYSTEMS coordinate with unit description.
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Water coils shall be constructed of not less than 1/2-inch outside diameter (od) DN15 seamless copper tubing with copper or aluminum plate fins mechanically bonded or soldered to the tubes and shall be provided with not less than 5/8-inch od DN18 female solder connectors, accessory piping package with terminal connections for control valves, and manual air vent on returns. Provisions shall be made for coil removal.

2.6 DRAIN PANS

Drain pans shall be sized and located to collect condensed water dripping from any item within the unit enclosure. Drain pans shall be constructed of not lighter than 20-gage 1 millimeter galvanized steel, [stainless steel] [plastic] [_____] thermally insulated to prevent condensation. Thermal insulation shall be coated with a waterproofing compound. Not less than 3/4-inch National Pipe Thread (NPT) M20, (ISO) or 5/8-inch od DN18 copper drain connection shall be provided in the drain pan. Pans shall slope not less than 1/8-inch per foot 3 millimeter per 300 millimeter to drain.

2.7 FILTERS

Filters shall be provided for each unit and shall be glass fiber throwaway or permanent washable type, 1-inch 25 millimeter nominal thickness, in conformance with UL Bld Mat Dir. Filters shall be removable without tools.

2.8 MOTORS

Motors shall be direct connected, two-bearing, permanent split-capacitor type with built-in overload protection, conform to NEMA MG 1, and shall be mounted on a resilient base. Motors shall be designed for 1,060 revolutions per minute maximum on 115-volt, single-phase, 60-hertz power. Motors shall be furnished with three built-in speeds, with four insulated leads (common, high, medium, and low) to terminate in a control-junction box.

A solid-state variable speed controller capable of not less than 50 percent speed reduction shall be provided in lieu of step speed control, when so specified.

2.9 CONTROLS

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NOTE: Coordinate with Section 15902 CONTROL SYSTEMS.
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Applicable requirements of Section 15902 CONTROL SYSTEMS shall apply.

Unit manufacturer shall factory-install control valves furnished by the automatic temperature-control manufacturer.

Controls shall be in a unit-mounted control panel. Remote-mounted controllers shall be provided where indicated.

Motor speed-control switch shall provide speed selection and off position and shall be mounted to be conveniently accessible from an access door.

2.10 INSULATION

All thermal and acoustical insulation shall be contained within a double walled enclosure or sealed with a coating which is impervious to moisture.

PART 3 EXECUTION

3.1 INSTALLATION

Equipment shall be installed as indicated and specified and in accordance with manufacturer's recommendations. Dampers shall be set in a fixed position to provide the outside air quantity scheduled.

Installation Drawings shall be submitted for fan coil systems in accordance with referenced standards in this section.

3.2 TESTS

Coils shall be hydrostatically tested at 250 pounds per square inch (psi) 1750 kilopascal or under water at 250 psi 1750 kilopascal air pressure and shall be suitable for 200-psi 1400 kilopascal working pressure.

3.3 OPERATION AND MAINTENANCE

Contractor shall submit [6] [_____] copies of the Operation and Maintenance Manuals 30 calendar days prior to testing the fan coil units. Data shall be updated and resubmitted for final approval no later than 30 calendar days prior to contract completion.

-- End of Section --